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(12) **United States Patent**  
Bao et al.(10) Patent No.: **US 6,891,237 B1**  
(45) Date of Patent: **May 10, 2005**(54) **ORGANIC SEMICONDUCTOR DEVICE HAVING AN ACTIVE DIELECTRIC LAYER COMPRISING SILSESQUIOXANES**(75) Inventors: **Zhenan Bao**, North Plainfield, NJ (US); **Valerie Jeanne Kuck**, Upper Montclair, NJ (US); **Mark Anthony Paczkowski**, Andover, NJ (US)(73) Assignee: **Lucent Technologies Inc.**, Murray Hill, NJ (US)

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(57) **ABSTRACT**

An organic field effect transistor (FET) is described with an active dielectric layer comprising a low-temperature cured dielectric film of a liquid-deposited silsesquioxane precursor. The dielectric film comprises a silsesquioxane having a dielectric constant of greater than 2. The silsesquioxane dielectric film is advantageously prepared by curing oligomers having alkyl(methyl) and/or alkyl(methyl) pendant groups. The invention also embraces a process for making an organic FET comprising providing a substrate suitable for an organic FET; applying a liquid-phase solution of silsesquioxane precursors over the surface of the substrate; and curing the solution to form a silsesquioxane active dielectric layer. The organic FET thus produced has a high-dielectric, silsesquioxane film with a dielectric constant of greater than about 2, and advantageously, the substrate comprises an indium-tin oxide coated plastic substrate.

**13 Claims, 2 Drawing Sheets**